

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

603.39221CX1 / P5538-1
Page 2

Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Previously Presented) A liquid crystal display apparatus comprising:

- a pair of substrates, at least one of which is transparent;
- a liquid crystal layer disposed between the pair of substrates;
- a plurality of groups of electrodes disposed on at least one of the pair of substrates for applying an electric field to the liquid crystal layer;
- a liquid crystal display part having a plurality of active elements connected to the electrodes;
- drive means, supplied with display data from means for supplying data to be displayed, for driving individual pixels of the liquid crystal display part by applying a voltage corresponding to the display data to the individual pixels, the drive means including data emphasis means for comparing new display data supplied from the means for supplying data to be displayed with previous display data supplied from the means for supplying data to be displayed, and for emphasizing and converting the new display data to designated display data in response to a result of the comparison and the supplied data;
- an illumination unit including a plurality of illumination areas for illuminating the liquid crystal display part; and
- illumination control means for controlling an illumination start time and an illumination "on" time of each of the illumination areas of the illumination unit in

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 3

response to a result of the comparison of a new display data with a previous display data.

Claim 2 (Previously Presented) A liquid crystal display apparatus according to claim 1,

wherein in case that any change is detected in the display data by the comparison, the data emphasis means emphasizes and converts the new display data so as to increase the change, and modifies a response of a corresponding pixel of the liquid crystal display part so as to be larger than a value corresponding to an original value of the new display data; and

wherein the illumination control means controls the illumination start time and the illumination "on" time of a corresponding one of the illumination areas of the illumination unit so that a time integral value of an amount of light passing through the corresponding pixel while a display characteristic is changing is substantially identical to a time integral value of an amount of light passing through the corresponding pixel while the display characteristic is stable.

Claim 3 (Previously Presented) A liquid crystal display apparatus according to claim 1,

wherein in case that any change is detected in the display data by the comparison, the data emphasis means emphasizes and converts the new display data so as to increase the change, and modifies a response of a corresponding pixel of the liquid crystal display part so as to be larger than a value corresponding to an original value of the new display data; and

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 4

wherein the illumination control means controls the illumination start time and the illumination "on" time of a corresponding one of the illumination areas of the illumination unit so that visual sensation values with respect to light passing through the corresponding pixel in the course of response and after response are substantially identical to each other.

Claim 4 (Previously Presented) A liquid crystal display apparatus according to claim 1, wherein the illumination start time and the illumination "on" time of the illumination areas of the illumination unit are predefined so as to be equal to average values of values for all the display data dependent on the individual display data according to the response of the liquid crystal display part after data conversion.

Claim 5 (Previously Presented) A liquid crystal display apparatus according to claim 2, wherein the illumination start time and the illumination "on" time of the illumination areas of the illumination unit are predefined so as to be equal to average values of values for all the display data dependent on the individual display data according to the response of the liquid crystal display part after data conversion.

Claim 6 (Previously Presented) A liquid crystal display apparatus according to claim 3, wherein the illumination start time and the illumination "on" time of the illumination areas of the illumination unit are predefined so as to be equal to average values of values for all the display data dependent on the individual display data according to the response of the liquid crystal display part after data conversion.

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 5

Claim 7 (Previously Presented) A liquid crystal display apparatus according to claim 1, wherein the illumination start time and the illumination "on" time of the illumination areas of the illumination unit are changed adaptively and determined so as to be average values weighted with a number of display data to be displayed at an area among values dependent on the individual display data according to the response of the liquid crystal display part after data emphasis and conversion.

Claim 8 (Previously Presented) A liquid crystal display apparatus according to claim 2, wherein the illumination start time and the illumination "on" time of the illumination areas of the illumination unit are changed adaptively and determined so as to be average values weighted with a number of display data to be displayed at an area among values dependent on the individual display data according to the response of the liquid crystal display part after data emphasis and conversion.

Claim 9 (Previously Presented) A liquid crystal display apparatus according to claim 3, wherein the illumination start time and the illumination "on" time of the illumination areas of the illumination unit are changed adaptively and determined so as to be average values weighted with a number of display data to be displayed at an area among values dependent on the individual display data according to the response of the liquid crystal display part after data emphasis and conversion.

Claim 10 (Previously Presented) A liquid crystal display apparatus according to claim 1, wherein the light source includes a sheet-type light emitting element.

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 6

Claim 11 (Previously Presented) A liquid crystal display apparatus comprising:

- a liquid crystal display part for displaying a picture signal;
- drive means for driving the liquid crystal display part, the drive means including picture signal emphasis means for comparing a new picture signal supplied from means for supplying a picture signal with a previous picture signal supplied from means for supplying a picture signal, and emphasizing and converting the new picture signal in response to a result of the comparison and the supplied picture signal;
- at least one light source; and
- an illumination unit including a light amount adjusting part for adjusting an amount of light from the light source for a plurality of illumination areas of the illumination unit; and
- illumination control means for controlling the light amount adjusting part of the illumination unit in response to a result of the comparison of a new picture signal with a previous picture signal, to control a lighting timing and a lighting period of time of the light source.

Claim 12 (Previously Presented) A liquid crystal display apparatus according to claim 11, wherein the light amount adjusting part of the illumination unit is transparent to light when a voltage is not applied to the light amount adjusting part.

Claim 13 (Previously Presented) A liquid crystal display apparatus according to claim 11, wherein the light source includes a sheet-type light emitting element.

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 7

Claim 14 (Previously Presented) A liquid crystal display apparatus according to claim 11,

wherein in case that any change is detected in the picture signal by the comparison, the picture signal emphasis means emphasizes and converts the new picture signal so that a display of a corresponding pixel in the liquid crystal display part is changed with a value more than a value corresponding to an original picture signal by arrival of a next picture signal; and

wherein the illumination control means controls the light amount adjusting part of the illumination unit so that a time integral value of an amount of light passing through the corresponding pixel while the display of the corresponding pixel is changing is substantially identical to a time integral value of an amount of light passing through the corresponding pixel while the display of the corresponding pixel is stable.

Claim 15 (Previously Presented) A liquid crystal display apparatus according to claim 11,

wherein in case that any change is detected in the picture signal by the comparison, the picture signal emphasis means emphasizes and converts the new picture signal so that the change increases, and changes a display of a corresponding pixel in the liquid crystal display part with a value more than a value corresponding to an original picture signal by an arrival of next picture signal; and

wherein the illumination control means controls the light amount adjusting part of the illumination unit so that visual sensation values with respect to the light

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 8

passing through the corresponding pixel in the course of response and after response are substantially identical to each other.

Claim 16 (Previously Presented) A liquid crystal display apparatus according to claim 11, wherein the lighting timing and the lighting period of time of the light source are predefined so as to be average values of values for all the display data dependent on the individual display data according to the response of the liquid crystal display part after data conversion.

Claim 17 (Previously Presented) A liquid crystal display apparatus according to claim 14, wherein the lighting timing and the lighting period of time of the light source are predefined so as to be average values of values for all the display data dependent on the individual display data according to the response of the liquid crystal display part after data conversion.

Claim 18 (Previously Presented) A liquid crystal display apparatus according to claim 11, wherein the lighting timing and the lighting period of time of the light source are changed adaptively and determined so as to be average values weighted with the number of display data to be displayed at an area illuminated by the illumination unit among values dependent on the individual display data according to the response of the liquid display part after data emphasis and conversion.

Claim 19 (Previously Presented) A liquid crystal display apparatus according to claim 12, wherein the lighting timing and the lighting period of time of the light

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 9

source are changed adaptively and determined so as to be average values weighted with the number of display data to be displayed at an area illuminated by the illumination unit among values dependent on the individual display data according to the response of the liquid display part after data emphasis and conversion.

Claim 20 (Previously Presented) A liquid crystal display apparatus according to claim 14, wherein the lighting timing and the lighting period of time of the light source are changed adaptively and determined so as to be average values weighted with the number of display data to be displayed at an area illuminated by the illumination unit among values dependent on the individual display data according to the response of the liquid display part after data emphasis and conversion.

Claim 21 (Withdrawn) A liquid crystal display apparatus comprising:
a pair of substrates, at least one of which is transparent;
a liquid crystal layer disposed between the pair of substrates;
a plurality of groups of electrodes disposed on at least one of the pair of substrates for applying an electric field to the liquid crystal layer;
a liquid crystal display part having a plurality of active elements connected to the electrodes;

drive means, supplied with display data from means for supplying data to be displayed, for driving individual pixels of the liquid crystal display part by applying a voltage corresponding to the display data to the individual pixels, the drive means including data emphasis means for comparing new display data supplied from the means for supplying data to be displayed with previous display data supplied from

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 10

the means for supplying data to be displayed, and for emphasizing and converting the new display data to designated display data in response to a result of the comparison and the supplied data;

an illumination unit including a plurality of illumination areas for illuminating the liquid crystal display part; and

illumination control means for controlling an illumination start time and an illumination "on" time of each of the illumination areas of the illumination unit, the illumination start time and the illumination "on" time are adjusted to be equal to the average of the optimum values for all the individual gradations to be covered.

Claim 22 (Withdrawn) A liquid crystal display apparatus comprising:

a pair of substrates, at least one of which is transparent;

a liquid crystal layer disposed between the pair of substrates;

a plurality of groups of electrodes disposed on at least one of the pair of substrates for applying an electric field to the liquid crystal layer;

a liquid crystal display part having a plurality of active elements connected to the electrodes;

drive means, supplied with display data from means for supplying data to be displayed, for driving individual pixels of the liquid crystal display part by applying a voltage corresponding to the display data to the individual pixels, the drive means including data emphasis means for comparing new display data supplied from the means for supplying data to be displayed with previous display data supplied from the means for supplying data to be displayed, and for emphasizing and converting

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 11

the new display data to designated display data in response to a result of the comparison and the supplied data;

an illumination unit including a plurality of illumination areas for illuminating the liquid crystal display part; and

illumination control means for controlling an illumination start time and an illumination "on" time of each of the illumination areas of the illumination unit in response to a transition of transmittance of the liquid crystal layer.

Claim 23 (Previously Presented) A liquid crystal display apparatus comprising:

a pair of substrates, at least one of which is transparent;

a liquid crystal layer disposed between the pair of substrates;

a plurality of groups of electrodes disposed on at least one of the pair of substrates for applying an electric field to the liquid crystal layer;

a liquid crystal display part having a plurality of active elements connected to the electrodes;

drive means for driving individual pixels of the liquid crystal display part by applying a voltage corresponding to display data to the individual pixels, the drive means including data emphasis means for comparing new display data with previous display data, and for emphasizing and converting the new display data to designated display data in response to a result of the comparison and the supplied data;

an illumination unit including a plurality of illumination areas for illuminating the liquid crystal display part; and

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 12

illumination control means for independently adjusting an instance of an illumination start time and a length of an illumination "on" time of each of the illumination areas of the illumination unit in response to real-time analysis of the new display data together with the previous display data.

Claim 24 (Previously Presented) A liquid crystal display apparatus according to claim 23, wherein the real-time analysis is a weighted analysis of the new display data together with the previous display data.

Claim 25 (Previously Presented) A liquid crystal display apparatus according to claim 1, wherein the controlling is an independent adjusting of the instance of the illumination start time and a length of the illumination "on" time of each of the illumination areas of the illumination unit in response to real-time analysis of the new display data together with the previous display data.

Claim 26 (Previously Presented) A liquid crystal display apparatus according to claim 11, wherein the control is an independent adjusting of an instance of an illumination start time and a length of an illumination "on" time of each of the illumination areas of the illumination unit in response to real-time analysis of the new picture signal together with the previous picture signal.

Claim 27 (Previously Presented) A liquid crystal display apparatus according to claim 21, wherein the controlling is an independent adjusting of the instance of the illumination start time and a length of the illumination "on" time of each of the

YAMAMOTO, et al., 10/735,725
16 September 2005 Response
Responsive to 16 June 2005 Office Action

503.39221CX1 / P5538-1
Page 13

illumination areas of the illumination unit in response to real-time analysis of the new display data together with the previous display data.

Claim 28 (Previously Presented) A liquid crystal display apparatus according to claim 22, wherein the controlling is an independent adjusting of the instance of the illumination start time and a length of the illumination "on" time of each of the illumination areas of the illumination unit in response to real-time analysis of the new display data together with the previous display data.